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# AGREEMENT

## CONCERNING THE ADOPTION OF UNIFORM CONDITIONS OF APPROVAL AND RECIPROCAL RECOGNITION OF APPROVAL FOR MOTOR VEHICLE EQUIPMENT AND PARTS

**done at Geneva on 20 March 1958**

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## UNIFORM PROVISIONS FOR THE APPROVAL OF MOTOR VEHICLE "SEALED BEAM" HEADLAMPS (SB) EMITTING A EUROPEAN ASYMMETRICAL PASSING BEAM OR A DRIVING BEAM OR BOTH

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UNITED NATIONS

Regulation No. 5

UNIFORM PROVISIONS FOR THE APPROVAL OF MOTOR VEHICLE "SEALED BEAM" HEADLAMPS (SB) EMITTING A EUROPEAN ASYMMETRICAL PASSING BEAM OR A DRIVING BEAM OR BOTH

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Regulation No. 5

UNIFORM PROVISIONS FOR THE APPROVAL OF MOTOR VEHICLE "SEALED BEAM" HEADLAMPS (SB) EMITTING A EUROPEAN ASYMMETRICAL PASSING BEAM OR A DRIVING BEAM OR BOTH

1. SCOPE 1/

This Regulation applies to motor vehicle headlamps which may incorporate lenses of glass or plastic material.

2. DEFINITIONS

For the purpose of this Regulation,

2.1. "Sealed beam" headlamp unit (hereinafter termed "SB unit"), means a headlamp unit whose components, comprising a reflector system, a lens system and one or more electrical light sources are all parts of an integral whole which has been sealed in the course of manufacture and which cannot be dismantled without rendering the unit completely unusable;

2.2. "Lens" means the outermost component of the headlamp (unit) which transmits light through the illuminating surface;

2.3. "Coating" means any product or products applied in one or more layers to the outer face of a lens;

2.4. SB units are considered to be of different types if they differ in one or more of the following essentials of form or characteristics:

2.4.1. Trade name or mark;

2.4.2. Characteristics of the optical system;

2.4.3. Inclusion of additional components capable of altering the optical effects by reflection, refraction, absorption and/or deformation during operation;

2.4.4. The rated voltage (the same approval number may be granted if the only change is of rated voltage);

2.4.5. The rated wattage;

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1/ Nothing in this regulation shall prevent a Party to the Agreement applying this Regulation from prohibiting the combination of a headlamp incorporating a lens of plastic material approved under this Regulation with a mechanical headlamp-cleaning device (with wipers).

2.4.6. The shape of the filament(s);

2.4.7. The kind the beam produced (passing beam, driving beam of both);

2.4.8. Suitability for right-hand or left-hand traffic or for both traffic systems;

2.4.9. The colour of the light emitted;

2.4.10. The materials constituting the lens and coating, if any.

3. APPLICATION FOR APPROVAL

3.1. The application for approval shall be submitted by the owner of the trade name or mark or by his duly accredited representative. It shall specify:

3.1.1. Whether the SB unit is intended to provide both a passing beam and a driving beam, or only one of these beams;

3.1.2. Whether, if the headlamp is intended to provide a passing beam, it is designed for both left-hand and right-hand traffic or for either left-hand or right-hand traffic only;

3.1.3. Where applicable, that it is designed for agricultural or forest tractors and other slow-moving vehicles (see annex 1).

3.2. Every application for approval shall be accompanied by:

3.2.1. Drawings in triplicate, sufficiently detailed to permit identification of the type and giving a front view of the unit (with, if applicable, details of the lens moulding) and a cross-section; also the filament(s) and shield(s) shall be shown on the drawings at a scale of 2 : 1 both in front view and in side view; the drawing must show the position intended for the approval number and the additional symbols in relation to the circle of the approval mark;

3.2.2. Brief technical description;

3.2.3. Samples as follows:

3.2.3.1. For approval of an SB unit to emit white light: five samples;

3.2.3.2. For approval of a unit to emit coloured light: one coloured-light sample, and five white-light samples differing from the type submitted only in that the lens or filter is not coloured.

3.2.3.3. In the case of SB units differing only in that they are designed to emit coloured light from a type designed to emit white light and which has previously satisfied the tests in paragraphs 6, 7 and 8 below, it will be sufficient to submit one sample of the coloured-light type to undergo only the tests given in paragraph 9.

3.2.3.4. For the test of plastic material of which the lenses are made:

3.2.4.1. thirteen lenses;

3.2.4.1.1. six of these lenses may be replaced by six samples of material at least 60 x 80 mm in size, having a flat or convex outer surface and a substantially flat area (radius of curvature not less than 300 mm) in the middle measuring at least 15 x 15 mm;

3.2.4.1.2. every such lens or sample of material shall be produced by the method to be used in mass production;

3.2.4.2. a reflector to which the lenses can be fitted in accordance with the manufacturer's instructions.

3.3. The materials making up the lenses and coatings, if any, shall be accompanied by the test report of the characteristics of these materials and coatings if they have already been tested.

3.4. The competent authority shall verify the existence of satisfactory arrangements for ensuring effective control of the conformity of production before type approval is granted.

4. MARKINGS 2/

4.1. SB units submitted for approval shall bear the trade name or mark of the applicant.

4.2. They shall comprise on the front lens, a space of sufficient size for the approval mark and the additional symbols provided for in paragraph 5 below; the space must be shown on the drawings referred to in paragraph 3.2.1. above.

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2/ In the case of SB units designed to meet the requirements of traffic moving on one side of the road only (either right or left), it is further recommended that the area which can be occulted to prevent discomfort to users in a country where traffic moves on the side of the road opposite to that of the country for which the SB unit was designed should be outlined indelibly on the front lens. This marking is not necessary, however, where the area is clearly apparent from the design.

4.3. They shall carry, either on the front lens or on the body, the values of the rated voltage and of the rated wattage of the driving beam filament, followed by that of the rated wattage of the passing beam filament, as applicable.

4.4. In the case of SB units designed to meet the requirements both of countries where the traffic keeps to the right and of those where the traffic keeps to the left, the two settings of the unit on the vehicle shall be marked by the letters "R/D" for the position for right-hand traffic and the letters "L/G" for the position for left-hand traffic.

4.5. The trade names or marks and markings provided for under this paragraph 4 shall be clearly legible and indelible.

5. APPROVAL

5.1. General

5.1.1. If all the headlamp type samples submitted in accordance with paragraph 3 above satisfy the provisions of this Regulation, approval shall be granted.

5.1.2. Where grouped, combined or reciprocally incorporated lamps satisfy the requirements of more than one Regulation, a single international approval mark may be affixed provided that each of the grouped, combined or reciprocally incorporated lamps satisfies the provisions applicable to it.

5.1.3. An approval number shall be assigned to each type approved. The same Contracting Party may not assign the same number to another type of headlamp covered by this Regulation except in the case of an extension of the approval to a device differing only in the colour of the light emitted.

5.1.4. Notice of approval or of extension or refusal or withdrawal of approval or production definitely discontinued, of a type of headlamp pursuant to this regulation shall be communicated to the Parties to the 1958 Agreement applying this Regulation, by means of a form conforming to the model in annex 2 to this Regulation.

5.1.5 In addition to the mark prescribed in paragraph 4.1, an approval mark as described in paragraphs 5.2 and 5.3 below shall be affixed in the spaces referred to in paragraph 4.2 above to every headlamp conforming to a type approved under this Regulation.

5.2. Composition of the approval mark

The approval mark shall consist of:

5.2.1. An international approval mark, comprising:

5.2.1.1. A circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval; 3/

5.2.1.2. The approval number prescribed in paragraph 5.1.3 above.

5.2.2. The following additional symbol (or symbols):

5.2.2.1. On SB headlamps meeting left-hand traffic requirements only, a horizontal arrow pointing to the right of an observer facing the SB headlamp, i.e. to the side of the road on which the traffic moves;

5.2.2.2. On SB headlamps designed to meet the requirements of both traffic systems by means of an appropriate adjustment of the setting of the headlamp, a horizontal arrow with a head on each end, the heads pointing respectively to the left and to the right;

5.2.2.3. On headlamps meeting the requirements of this Regulation in respect of the passing beam only, the letters "SC";

5.2.2.4. On headlamps meeting the requirements of this Regulation in respect of the driving beam only, the letters "SR";

5.2.2.5 On headlamps meeting the requirements of this Regulation in respect of both the passing beam and the driving beam, the letters "SCR";

5.2.2.6 On headlamps incorporating a lens of plastic material, the group of letters "PL" shall be affixed near the symbols prescribed in paragraphs 5.2.2.3 to 5.2.2.5 above;

5.2.2.7. In every case the relevant operating mode during the next procedure according to paragraph 1.1.1.1. of annex 5 and the allowed voltage(s) according to paragraph 1.1.1.2 of annex 5 shall be stipulated on the approval certificates and on the communication form transmitted to the countries which are Contracting Parties to the Agreement and which apply this Regulation.

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3/ 1 for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for the Czech and Slovak Federal Republic, 9 for Spain, 10 for Yugoslavia, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 (vacant), 16 for Norway, 17 for Finland, 18 for Denmark, 19 for Romania, 20 for Poland, 21 for Portugal and 22 for the Russian Federation. Subsequent numbers will be assigned to other countries in the chronological order in which they ratify or accede to the Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, and the numbers thus assigned shall be communicated to the Contracting Parties to the Agreement by the Secretary-General of the United Nations.

In the corresponding cases the device shall be marked as follows:

On units meeting the requirements of this Regulation which are so designed that the filament of the passing beam shall not be lit simultaneously with that of any other lighting function with which it may be reciprocally incorporated:

An oblique stroke (/) shall be placed behind the passing lamp symbol in the approval mark;

5.2.2.8 The two digits of the approval number (at present 02) which indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation and at the time of issue of the approval and, if necessary, the required arrow may be marked close to the above additional symbols;

5.2.2.9 The marks and symbols referred to in paragraphs 5.2.1 and 5.2.2 above shall be clearly legible and indelible even when the headlamp is fitted in the vehicle.

5.3 Arrangement of the approval mark

5.3.1 Independent lamps

Annex 4, figures 1 to 9, to this Regulation gives examples of arrangements of the approval mark with the above-mentioned additional symbols.

5.3.2 Grouped, combined or reciprocally incorporated lamps

5.3.2.1 Where grouped, combined or reciprocally incorporated lamps have been found to comply with the requirements of several Regulations, a single international approval mark may be affixed, consisting of a circle surrounding the letter "E" followed by the distinguishing number of the country which has granted the approval, and an approval number. This approval mark may be located anywhere on the grouped, combined or reciprocally incorporated lamps, provided that:

5.3.2.1.1. It is visible after their installation;

5.3.2.1.2. No part of the grouped, combined or reciprocally incorporated lamps that transmits light can be removed without at the same time removing the approval mark.

5.3.2.2. The identification symbol for each lamp appropriate to each Regulation under which approval has been granted, together with the corresponding series of amendments incorporating the most recent major technical amendments to the Regulation at the time of issue of the approval and, if necessary, the required arrow shall be marked:

5.3.2.2.1. Either on the appropriate light-emitting surface,

5.3.2.2.2. Or in a group, in such a way that each of the grouped, combined or reciprocally incorporated lamps may be clearly identified (see four possible examples in annex 4).

5.3.2.3 The size of the components of a single approval mark shall not be less than the minimum size required for the smallest of the individual marks by the Regulation under which approval has been granted.

5.3.2.4 An approval number shall be assigned to each type approved. The same Contracting Party may not assign the same number to another type of grouped, combined or reciprocally incorporated lamps covered by this Regulation.

5.3.2.5 Annex 4, figure 10, to this Regulation gives examples of arrangements of approval marks for grouped, combined or reciprocally incorporated lamps with all the above-mentioned additional symbols.

5.3.3 Lamps, the lens of which is used for different types of headlamps and which may be reciprocally incorporated or grouped with other lamps

The provisions laid down in paragraph 5.3.2 above are applicable.

5.3.3.1 In addition, where the same lens is used, the latter may bear the different approval marks relating to the different types of headlamps or units of lamps, provided that the main body of the headlamp, even if it cannot be separated from the lens, also comprises the space described in paragraph 4.2 above and bears the approval mark of the actual functions.

If different types of headlamps comprise the same main body, the latter may bear the different approval marks.

5.3.3.2 Annex 4, figure 11, to this Regulation gives examples of arrangements of approval marks relating to the above case.

6. GENERAL SPECIFICATIONS

6.1. Each sample shall conform to the specifications set forth in this paragraph 6 and in paragraphs 7 and 8 below, and, if necessary, paragraph 9.

6.2. SB units shall be so made as to retain their prescribed photometric characteristics and to remain in good working order when in normal use, despite the vibrations to which they may be subjected.

6.2.1. Headlamps shall be fitted with a device enabling them to be so adjusted on the vehicle as to comply with the rules applicable to them. Such a device need not be fitted on the SB headlamp inserts if the use of such inserts is confined to vehicles on which the headlamp setting can be adjusted by other means. Where an SB headlamp providing a driving beam and an SB headlamp providing a passing beam are assembled as exchangeable subunits to form a composite unit the adjusting device shall enable each SB unit individually to be duly adjusted.

6.2.2. However, this will not apply to headlamp assemblies whose reflectors are indivisible. For this type of assembly the requirements of paragraph 8 of this Regulation shall apply. In the case where more than one light source is used to provide the main beam the combined main-beam functions will be used to determine the maximum value of the illumination (E max).

6.3. The terminals shall only be in electrical connection with the appropriate filament or filaments and shall be robust and firmly fixed to the unit.

6.4. If the units are circular they shall provide all the physical features and electrical connections shown in one of the plates $SB_2$ - $SB_7$ in annex 4 and shall be made to the dimensions in that plate.

6.5. SB units designed to meet the requirements both of countries where the traffic keeps to the right and of those where the traffic keeps to the left, may be adapted for traffic on a given side of the road either by an appropriate initial setting when fitted on the vehicle, or by selective setting by the user. Such initial or selective setting may consist, for example, of fixing the angular setting of the unit on the vehicle. In all cases, only two precise setting positions, one for right-hand and one for left-hand traffic, shall be possible, and the design shall preclude inadvertent shifting of the unit from the one position to the other or its setting in an intermediate position. Conformity with the requirements of this paragraph shall be verified visually and, where necessary, by a test fitting.

6.6. Complementary tests shall be done according to the requirements of annex 5 to ensure that in use there is no excessive change in photo metric performance.

6.7 If the lens of the headlamp is of plastic material, tests shall be done according to the requirements of annex 6.

7. RATED VALUES

7.1 The values of rated voltage are: 6, 12 and 24 volts. 4/

7.2 The power consumed at the test voltage by any submitted SB unit shall not exceed the rated wattage marked on the unit, by more than the percentage specified in table 1. No lower limit is specified for the tolerance on wattage but the minimum illumination values specified in table 2 of paragraph 8.8 must be obtained.

Table 1

| | | Circular units of 180 mm diameter | | Circular units of 145 mm diameter | |
|---|---|---|---|---|---|
| Rated voltage | | 6 | 12 | 6 | 12 |
| Test voltage | | 6 | 12 | 6 | 12 |
| | | Rated wattage and permitted tolerance | | | |
| Double filaments 5/ | Driving beam | 60 + 0% | | 37.5 + 0% | |
| | Passing beam | 50 + 0% | | 50 + 0% | |
| Driving beam filament only | | 75 + 0% | | 50 + 0% | |
| Passing beam filament only | | 50 + 0% | | 50 + 0% | |

8. ILLUMINATION 6/

8.1 SB units shall be so made as to give adequate illumination without dazzle for the passing beam, and good illumination for the driving beam.

8.2. The illumination produced by the unit shall be checked on a vertical screen set at a distance of 25 m in front of the unit and at right angles to its axis (see annex 4, plates $SB_{8a}$ and $SB_{8b}$).

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4/ 24-volt units are under consideration.

5/ In the case of SB units with double filaments, the samples may be submitted for approval for the two functions or for the passing beam only.

6/ All the photometric measurements shall be carried out at the test voltage given in paragraph 7.

8.3. The passing beam must produce a sufficiently sharp "cut-off" to permit satisfactory alignment with its aid. The "cut-off" must be a horizontal line on the side opposite to the direction of the traffic for which the unit is intended; on the other side it should be horizontal or within an angle of 15° above the horizontal.

8.4. The SB unit shall be aimed so that on passing beam:

8.4.1. In the case of units designed to meet the requirements of right-hand traffic, the "cut-off" on the left half of the screen 7/ is horizontal and, in the case of units designed to meet the requirements of left-hand traffic, the "cut-off" on the right half of the screen is horizontal;

8.4.2. This horizontal part of the "cut-off" is situated, on the screen, 25 cm below the level of the horizontal plane passing through the focus of the unit (see annex 4, plates $SB_{Sa}$ and $SB_{Sh}$);

8.4.3. The screen is in the position indicated in annex 4, plates $SB_{Sa}$ and $SB_{Sh}$. 8/

8.5. When so aimed, the unit need, if its approval is sought solely for a passing beam, 9/ meet only the requirements referred to in paragraph 8.8 below; if it is intended to provide both a passing beam and a driving beam it shall meet the requirements referred to in paragraphs 8.8 and 8.9.

8.6. Where an SB unit so aimed does not meet the requirements referred to in paragraphs 8.8 and 8.9 below, its alignment may be changed, provided that the axis of the beam is not laterally displaced by more than 1° (= 44 cm) to the right or left. 10/ To facilitate alignment by means of the "cut-off", the unit may be partially occulted in order to sharpen the "cut-off".

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7/ The test screen must be sufficiently wide to allow examination of the "cut-off" over a range of at least 5° from the line vv.

8/ If, in the case of a unit designed to meet the requirements of this Regulation with respect to the passing beam only, the focal axis diverges appreciably in from the general direction of the beam, lateral adjustment shall be effected in the manner which best satisfies the requirements for illumination at points 75 and B 50.

9/ A unit designed to emit a passing beam may incorporate a driving beam not complying with the specification.

10/ The limit of realignment of 1° towards the right or left is not incompatible with vertical realignment, which is only limited by the conditions laid down in paragraph 8.9.

8.7. In the case of an SB unit providing a driving beam only, it shall be so aimed that the area of maximum illumination is centred on the point of intersection HV of the lines hh and vv; such a unit need meet only the requirements referred to in paragraph 8.9.

8.8. The illumination produced on the screen by the passing beam shall meet the following requirements:

Table 2

| Point on measuring screen | | Required illumination in lux | |
|---|---|---|---|
| SB units for right-hand traffic | SB units for left-hand traffic | Minimum | Maximum |
| B 50 L<br>75 R | B 50 R<br>75 L | -<br>6 | 0.3<br>- |
| 50 R<br>25 L | 50 L<br>25 R | 6<br>1.5 | -<br>- |
| 25 R | 25 L | 1.5 | - |
| Every point in Zone III | | - | 0.7 |
| " " " " IV | | 2 | - |
| " " " " I | | - | 20 |

8.8.1. There shall be no lateral variations detrimental to good visibility in any of the zones, I, II, III and IV;

8.8.2. SB units designed to meet the requirements of both right-hand and left-hand traffic must, in each of the two setting positions, meet the requirements set forth above for the corresponding direction of traffic.

8.9. In the case of an SB unit designed to provide a driving beam and a passing beam, measurements of the illumination produced on the screen by the driving beam shall be taken with the same unit alignment and voltage as for measurements under paragraph 8.8 above.

8.10. The illumination produced on the screen by the driving beam shall meet the following requirements:

8.10.1. The point of intersection HV of the line hh and vv shall be situated within the isolux 90% of maximum illumination. The maximum value shall not be less than 32 lux;

8.10.2. Starting from point HV, horizontally to the right and left, illumination shall be not less than 16 lux up to a distance of 1.125 metres, and not less than 4 lux up to a distance of 2.25 metres.

8.11. The screen illumination values mentioned in paragraphs 8.8 and 8.9 above shall be measured by means of a photoelectric cell, the effective area of which shall be contained within a square of 65 mm side.

9. COLOUR

The light emitted shall be white or selective yellow. In the latter case the dominant wavelength must be between 5,750 and 5,850 Ångstrom units, the purity factor shall be between 0.90 and 0.98 and the illumination produced on the screen by the passing beam must meet the requirements of Table 2 with all the figures multiplied by a factor of 0.84. 11/

10. REMARK CONCERNING COLOUR

Any approval under this Regulation which is granted by virtue of paragraph 9 above for a type of SB unit emitting white light or selective yellow light, does not prevent the Contracting Parties from prohibiting, on the vehicles which they register, SB units emitting either white or selective yellow light, according to article 3 of the Agreement to which this Regulation is attached.

11. GAUGING OF DISCOMFORT

The discomfort caused by the passing beam of SB units shall be gauged. 12/

12. CONFORMITY OF PRODUCTION

Every SB unit bearing an approval mark as prescribed under this Regulation shall conform to the approved type and meet the requirements set forth above. Compliance with this provision shall

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11/ These specifications correspond to the following trichomatic coordinates: selective yellow (yellow within the meaning of annex 5, appendix, of the 1968 Convention on Road Traffic)

| | |
|---|---|
| Limit towards red | $y \geq 0.138 + 0.580x$ |
| Limit towards green | $y \leq 1.29x - 0.100$ |
| Limit towards white | $y \geq -x + 0.966$ |
| Limit towards spectrum edge | $y \leq -x + 0.992$ |

12/ This requirement will be the subject of a recommendation for the benefit of administrations.

be verified in accordance with annex 3 to this Regulation and to paragraph 3 of annex 5 to this Regulation and, if applicable, to paragraph 3 of annex 6 to this Regulation.

13. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

13.1. The approval granted in respect of an SB unit pursuant to this Regulation may be withdrawn if the requirements set forth above are not met, or if a unit bearing the approval mark does not conform to the type approved.

13.2. If a Contracting Party to the Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation, by means of a communication form conforming to the model in annex 2 to this Regulation.

14. MODIFICATIONS OF THE TYPE OF SEALED BEAM HEADLAMP UNIT (SB UNIT) AND EXTENSION OF APPROVAL

14.1 Every modification of the type of sealed beam headlamp unit (SB unit) shall be notified to the administrative department which approved the type of sealed beam headlamp unit (SB unit). The department may then either:

14.1.1. Consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the sealed beam headlamp unit (SB unit) still complies with the requirements; or

14.1.2. Require a further test report from the technical service responsible for conducting the tests.

14.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 5.1.4. above to the Parties to the Agreement applying this Regulation.

14.3. The competent authority issuing the extension of approval shall assign a series number to each communication form drawn up for such an extension and inform thereof the other parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in annex 2 to this Regulation.

15. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a device approved in accordance with this Regulation he shall so inform the authority which granted the approval. Upon receiving the relevant communication that authority shall inform thereof the

other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in annex 2 to this Regulation.

16. TRANSITIONAL PROVISIONS

16.1 As from the date of entry into force of the 02 series of amendments to this Regulation no Contracting Party applying it shall refuse to grant approvals under this Regulation as amended by the 02 series of amendments.

16.2. As from 24 months after the date of entry into force mentioned in paragraph 16.1 above, Contracting Parties applying this Regulation shall grant approvals only if the type of headlamp corresponds to the requirements of this Regulation as amended by the 02 series of amendments.

16.3. Existing approvals granted under this Regulation before the date mentioned in paragraph 16.2 above shall remain valid.

However, Contracting Parties applying this Regulation may prohibit the fitting of devices which do not meet the requirements of this Regulation as amended by the 02 series of amendments:

16.3.1. On vehicles for which type approval or individual approval is granted more than 24 months after the date of entry into force mentioned in paragraph 16.1 above;

16.3.2. On vehicles first registered more than five years after the date of entry into force mentioned in paragraph 16.1 above.

17. NAMES AND ADDRESSED OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS AND OF ADMINISTRATIVE DEPARTMENTS

The Parties to the 1958 Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or refusal or, extension or withdrawal of approval, or production definitely discontinued, issued in other countries, are to be sent.

## Annex 1

### SB UNITS FOR AGRICULTURAL OR FOREST TRACTORS AND OTHER SLOW-MOVING VEHICLES

1. The provisions of this Regulation shall also apply to the approval of special SB units for agricultural or forest tractors and other slow-moving vehicles, such units being intended to provide both a driving beam and a passing beam and having a diameter* of less than 160 mm with the following modifications:

1.1. The minimum requirements for illumination laid down in paragraph 8.8. of this Regulation shall be reduced in the ratio

$$\left(\frac{D - 45}{160 - 45}\right)^2$$

subject to the following absolute lower limits:

3 lux at either point 75R or point 75L;

5 lux at either point 50R or point 50L;

1.5 lux in zone IV;

1.2. Instead of the symbols provided for in paragraph 5.2.2. of this Regulation, the unit shall be marked with the letters "SM" in an inverted triangle.

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* If the projected area of the reflector is not circular, the diameter shall be that of a circle having the same area as the projected area of the apparent useful surface of the reflector.

Annex 2

(maximum format: A4 (210 x 297 mm)

COMMUNICATION

issued by: Name of administration:

.....

.....

.....

concerning: 2/ APPROVAL GRANTED

APPROVAL EXTENDED

APPROVAL REFUSED

APPROVAL WITHDRAWN

PRODUCTION DEFINITELY DISCONTINUED

of a type of sealed beam headlamp unit (SB unit) pursuant to Regulation No. 5

Approval No. ... Extension No. .....

1. SB unit submitted for approval as type 3/ .....
   Colour of light emitted: white/selective yellow 2/
   Rated voltage .....
   Rated wattage .....

2. The passing lamp filament may/may not 2/ be lit simultaneously with the driving lamp filament and/or another reciprocally incorporated lamp

3. Trade name or mark .....

4. Manufacturer's name and address .....

5. If applicable, name and address of manufacturer's representative .....

6. Submitted for approval on .....

7. Technical service responsible for conducting approval tests .....

8. Date of report issued by that service .....

9. Number of report issued by that service .....

10. Approval granted/refused/extended/withdrawn 2/

11. Reason(s) of extension (if applicable) .....

12. Maximum intensity (in lux) of the driving beam at 25 m from the unit .....

13. Extension of approval to headlamps emitting white/selective-yellow light 2/ .....

13.1. Test laboratory .....

13.2. Date and number of laboratory report .....

13.3. Date of extension of the approval .....

14. Place .....

15. Date .....

16. Signature .....

17. The attached drawing, No. ....., shows the unit in front view (with, if applicable, details of the lens moulding) and a cross-section.

---

1/ Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulation).

2/ Strike out what does not apply.

3/ Indicate the appropriate marking selected from the list below:

SCR, SCR, SCR, SC, SC, SC, SR, SM, SM, SM, SC/R, SC/R, SC/R,
SC/, SC/, SC/, SCR PL, SCR PL, SCR PL, SC PL, SC PL, SC PL,
SR PL, SMPL, SMPL, SMPL, SC/R PL, SC/R PL, SC/R PL,
SC/PL, SC/PL, SC/PL

## Annex 3

### VERIFICATION OF CONFORMITY OF PRODUCTION OF HEADLAMPS ("SEALED BEAM") EMITTING AN ASYMMETRICAL PASSING BEAM OR A DRIVING BEAM OR BOTH

1. Headlamps bearing an approval mark shall conform to the approval type.

2. The requirement of conformity shall be deemed satisfied from a mechanical and geometrical standpoint if the discrepancies do not exceed inevitable manufacturing errors.

3. As regards photometric performance the conformity of headlamps of the series shall not be contested if at least 90% of SB headlamps in a sample taken at random satisfy one of the following requirements: either

3.1. none of the values measured deviates unfavourably by more than 20% from the prescribed value (for values B50R or L and zone III, the maximum unfavourable deviation may be 0.2 lux (B50R or L), or 0.3 lux (zone III);

3.2. or if,

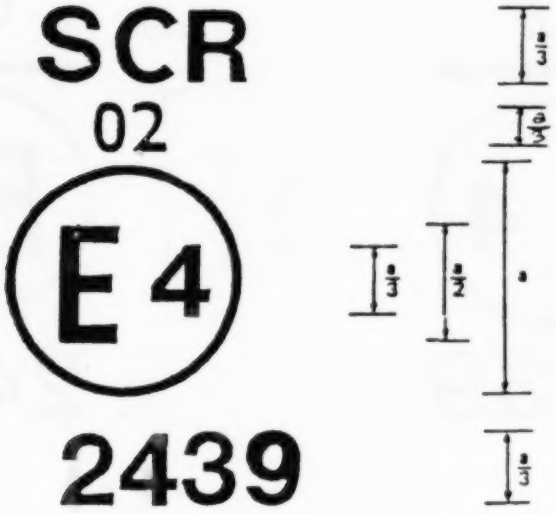
3.2.1. for the passing beam, the prescribed values are met at HV (with a tolerance of 0.2 lux) and at least one point of the area delimited on the measuring screen (at 25 m) by a circle 15 cm in radius around points B50R or L (with a tolerance of 0.1 lux), 75R or L, 50R or L, 25R or L, and in the entire area of zone IV which is not more than 22.5 cm above line 25R and 25L,

3.2.2. and if, for the driving beam, HV being situated within the isolux 0.75 $E_{max.}$ a tolerance of 20% is observed for the photometric values.

4. See also annex 5, paragraph 3 and, if applicable, annex 6, paragraph 3, to this Regulation.

Annex 4

EXAMPLES OF ARRANGEMENTS OF APPROVAL MARKS




a = 12 mm min.

Figure 1

The SB headlamp bearing the approval marking shown above is a headlamp approved in the Netherlands (E4), meeting the requirements of this Regulation as amended by the 02 series of amendments in respect of both the driving beam and the passing beam (SCR), and which is designed for right-hand traffic only.

NOTE: The approval number and the additional symbol(s) shall be placed close to the circle and either above or below the letter 'E', or to the right or left of that letter. The digits of the approval number shall be on the same side of the letter 'E' and face the same direction.

The additional symbol(s) must be diametrically opposed to the approval number.

The use of Roman numerals as approval numbers should be avoided so as to prevent any confusion with other symbols.

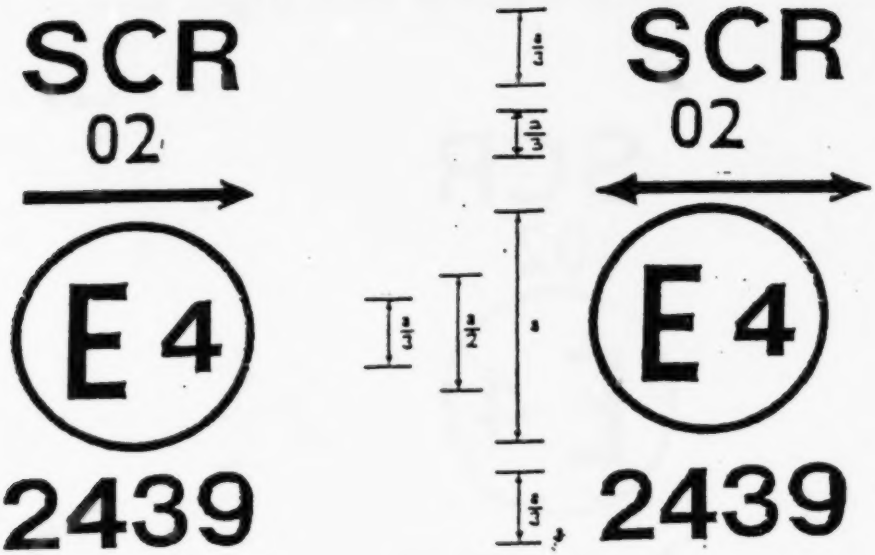



Figure 2

Figure 3a

Figure 3b

The SB headlamp bearing the approval marking shown above is a headlamp meeting the requirements of this Regulation with respect to both the passing beam and the driving beam and designed:

For left-hand traffic only.

For both traffic systems, by means of an adjustment as desired of the headlamp.

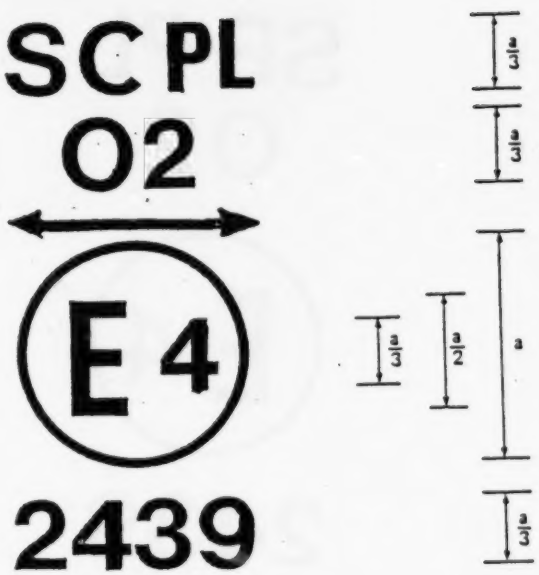



Figure 4




a = 12 mm min.

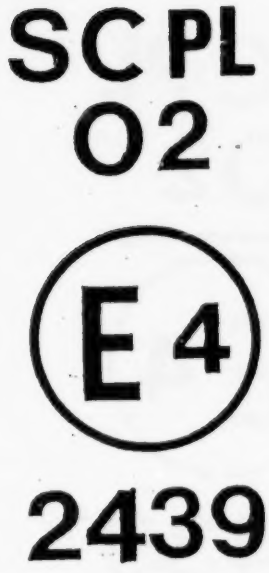
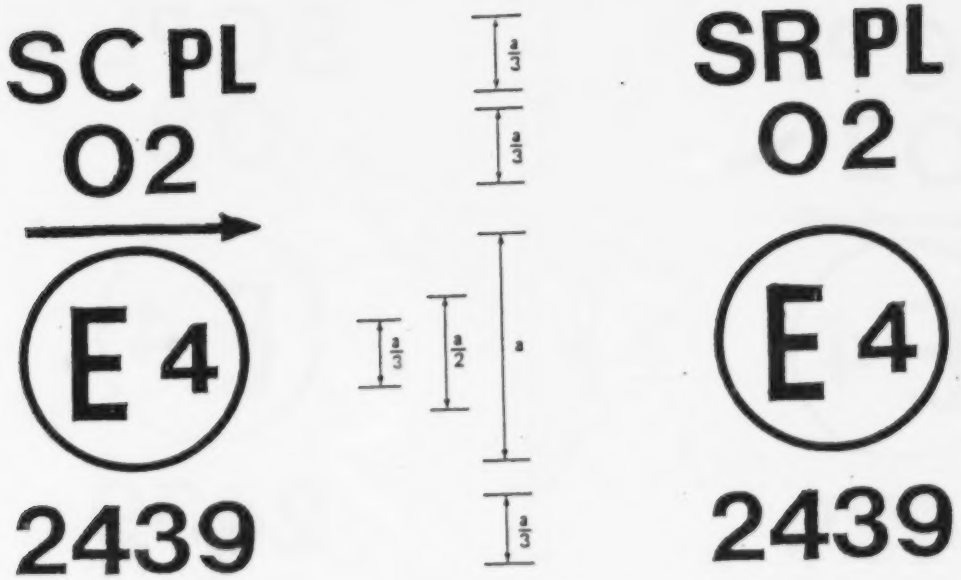



Figure 5

The SB headlamp bearing the approval mark shown above is a headlamp incorporating the lens of plastic material meeting the requirements of this Regulation with respect to the passing beam only, and designed:

For both traffic systems.

For right-hand traffic only.



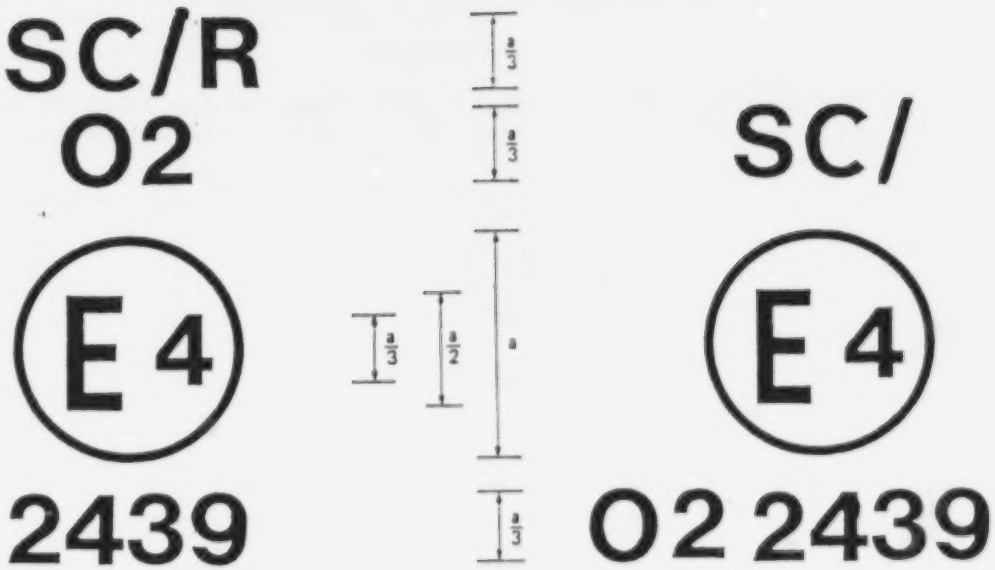

a = 12 mm min.

Figure 6

Figure 7

The SB headlamp bearing the approval mark shown above is a headlamp incorporating the lens of plastic material meeting the requirements of this Regulation:

| | |
|---|---|
| With respect to the passing beam only, and designed for left-hand traffic only. | With respect to the driving beam only. |




a = 12 mm min.

Figure 8

Figure 9

Identification of a headlamp meeting the requirements of Regulation No. 5

with respect to both the passing beam and the driving beam and designed for right-hand traffic only.

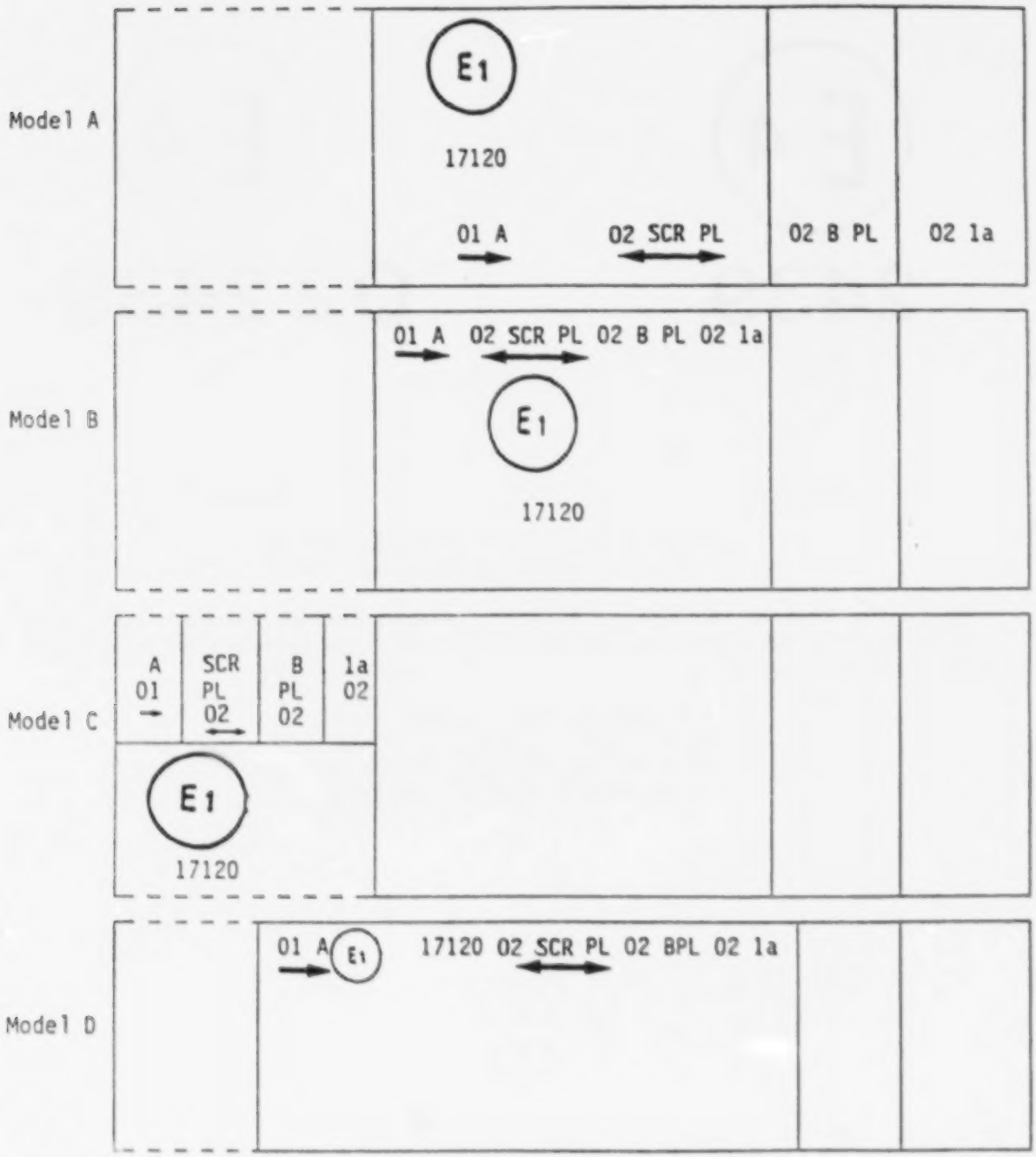
with respect to the passing beam only and designed for right-hand traffic only.

The passing lamp filament shall not be lit simultaneously with the driving lamp filament and/or another reciprocally incorporated lamp.

Examples of simplified markings for grouped, combined or reciprocally incorporated lamps

Figure 10

(The vertical and horizontal lines schematize the shape of the light-signalling device. They are not part of the approval mark).



NOTE: The four examples shown above correspond to a lighting device bearing an approval mark relating to:

A front position lamp approved in accordance with the 01 series of amendments to Regulation No. 7;

A headlamp meeting the requirements of this Regulation with respect to the passing beam and to the driving beam, and designed for both traffic systems and incorporating a lens of plastic material;

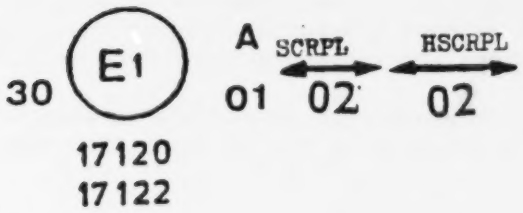
A front fog lamp approved in accordance with the 02 series of amendments to Regulation No. 19 and incorporating a lens of plastic material;

A front direction indicator lamp of category 1 a approved in accordance with the 02 series of amendments to Regulation No. 6.

Figure 11

Lamp reciprocally incorporated with a headlamp

Example 1




The above example corresponds to the marking of a lens of plastic material intended to be used in different types of headlamps, namely:

either: a headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam approved in Germany (E1) in accordance with the requirements of Regulation No. 5 as amended by the 02 series of amendments, which is reciprocally incorporated with a front position lamp approved in accordance with the 01 series of amendments to Regulation No. 7;

or: a headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam with a maximum intensity comprised between 86,250 and 101,250 candelas, approved in Germany (E1) in accordance with the requirements of Regulation No. 31 as amended by the 02 series of amendments which is reciprocally incorporated with the same front position lamp as above;

or even: either of the above-mentioned headlamps approved as a single lamp.

The main body of the headlamp shall bear the only valid approval number, for instance:

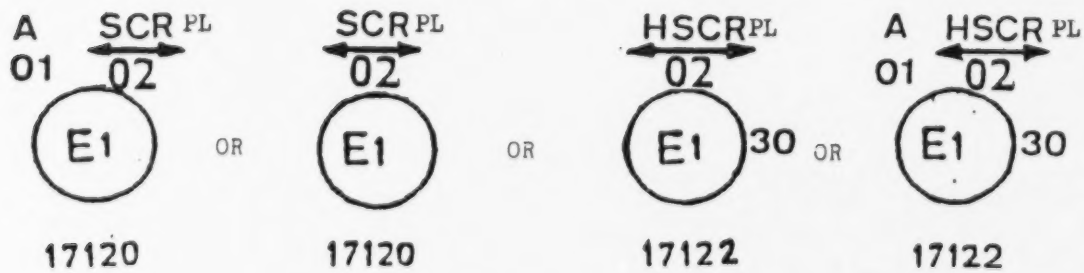
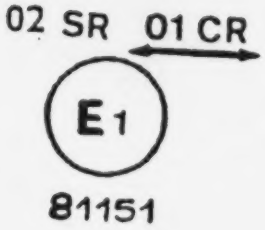


Figure 11

Example 2




The above example corresponds to the marking of a lens used in an assembly of two headlamps approved in Germany (E1), consisting of a headlamp emitting a passing beam designed for both traffic systems and of a driving beam meeting the requirements of Regulation No. 1, and of a headlamp emitting a driving beam meeting the requirements of Regulation No. 5.

PLATE SB2 - SEALED BEAM HEADLAMP UNIT, 180mm (7in) DIA. TYPE 2 DOUBLE BEAM ( PASSING & DRIVING )

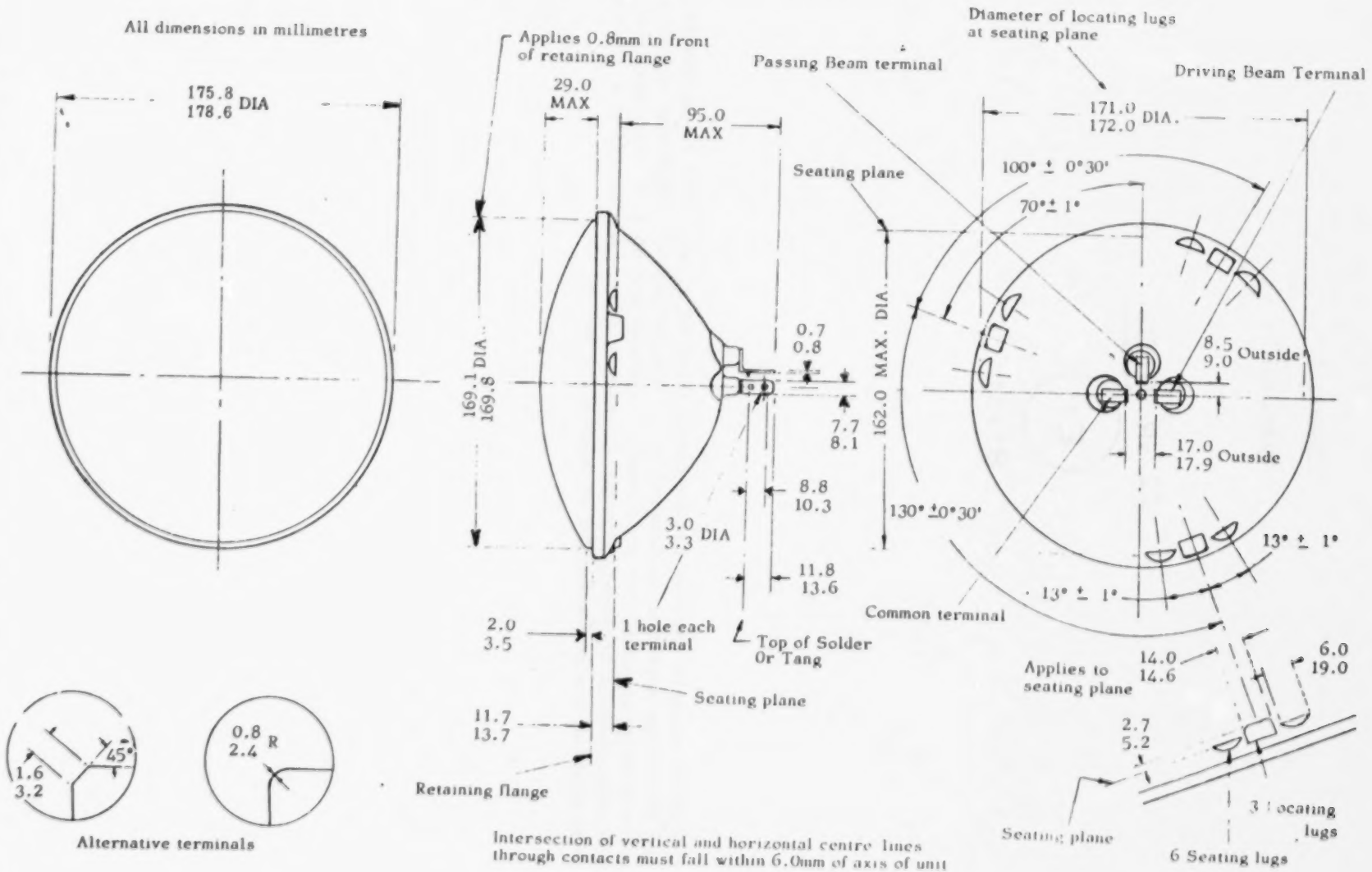
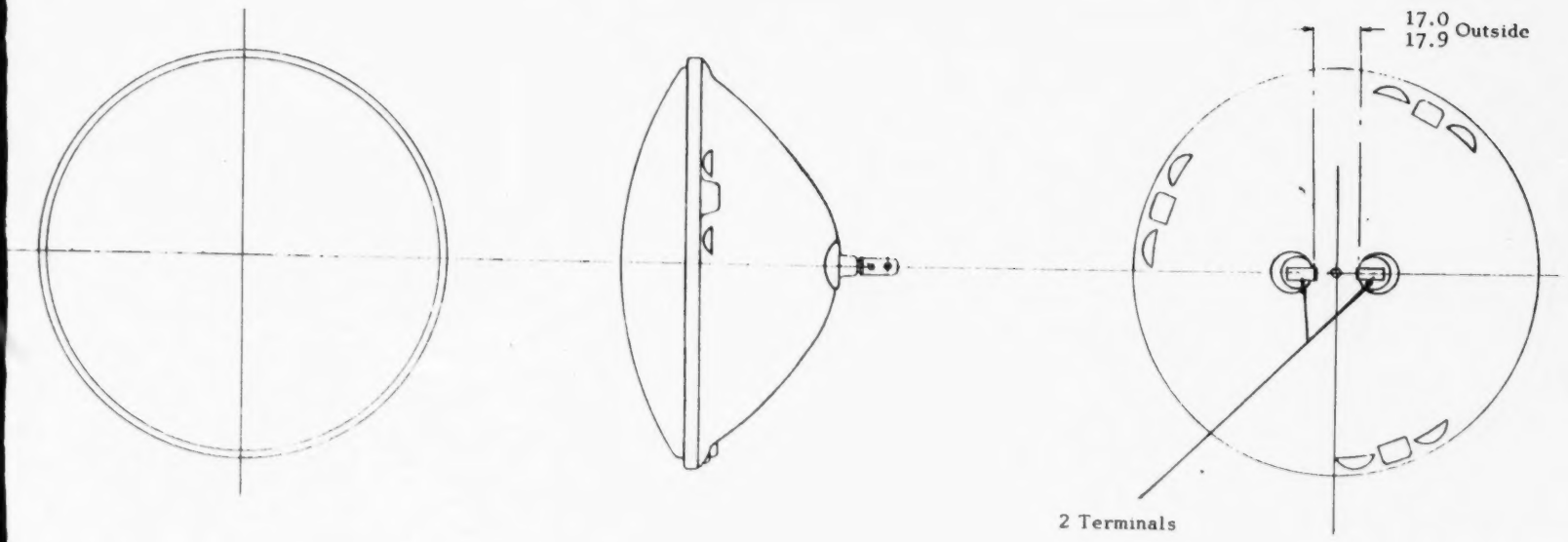


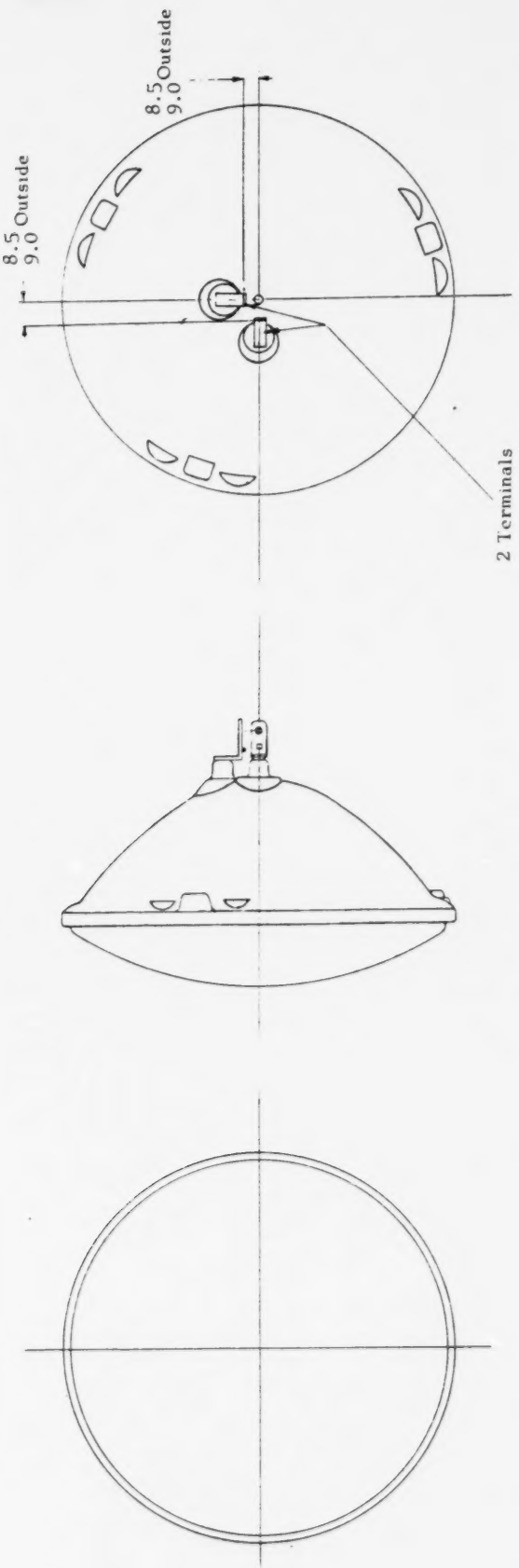
PLATE SB3 - SEALED BEAM HEADLAMP UNIT, 180mm (7in) DIA. TYPE 1 SINGLE BEAM ( DRIVING ONLY )

All dimensions in millimetres




Note: Same as Plate SB2 Sealed Beam Headlamp Unit, 180mm DIA, except as shown

PLATE SB4 - SEALED BEAM HEADLAMP UNIT, 180mm (7in) DIA. TYPE 2 SINGLE BEAM (PASSING ONLY)

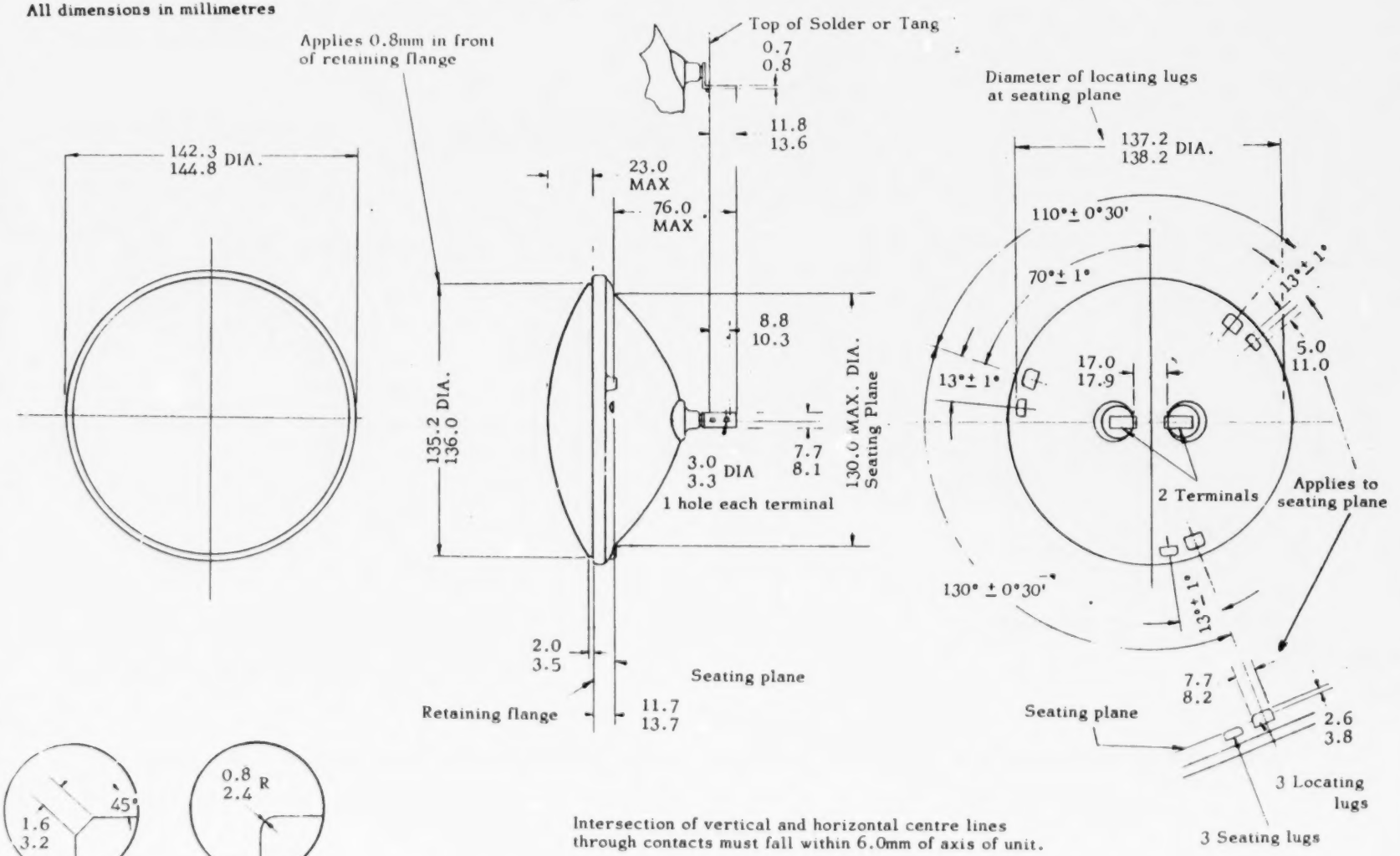



All dimensions in millimetres

Note: Same as Plate SB2 Sealed Beam Headlamp Unit, 180mm DIA, except as shown

PLATE SB5 - SEALED BEAM HEADLAMP UNIT, 145mm (5.75in) DIA. TYPE 1 SINGLE BEAM ( DRIVING ONLY )

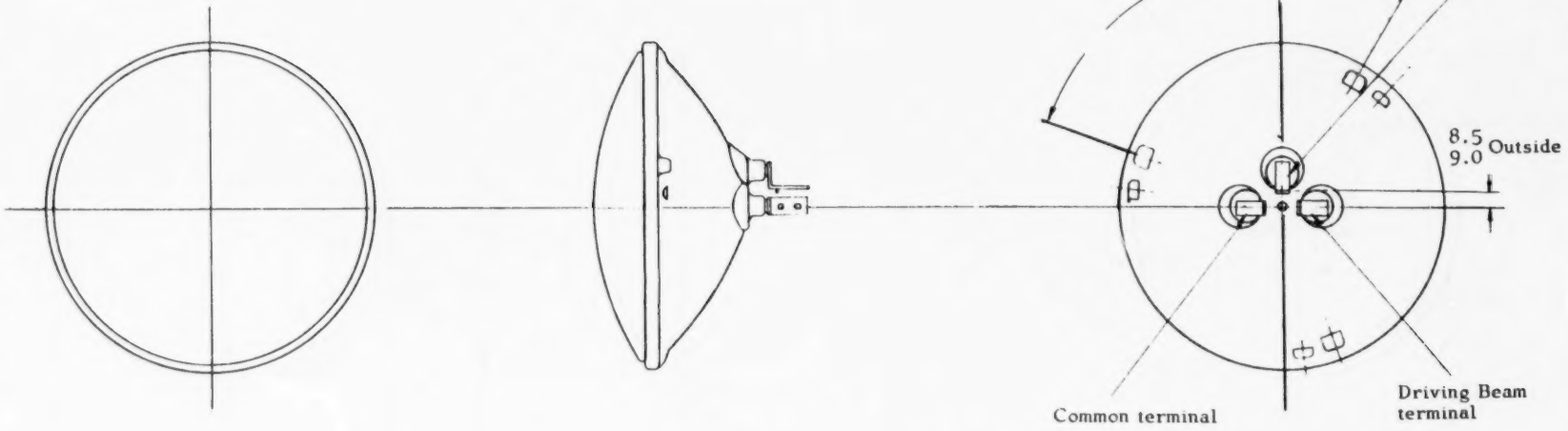
**All dimensions in millimetres**




Intersection of vertical and horizontal centre lines through contacts must fall within 6.0mm of axis of unit.

PLATE SB6 - SEALED BEAM HEADLAMP UNIT, 145mm ( 5.75in ) DIA. TYPE 2 DOUBLE BEAM ( PASSING & DRIVING )

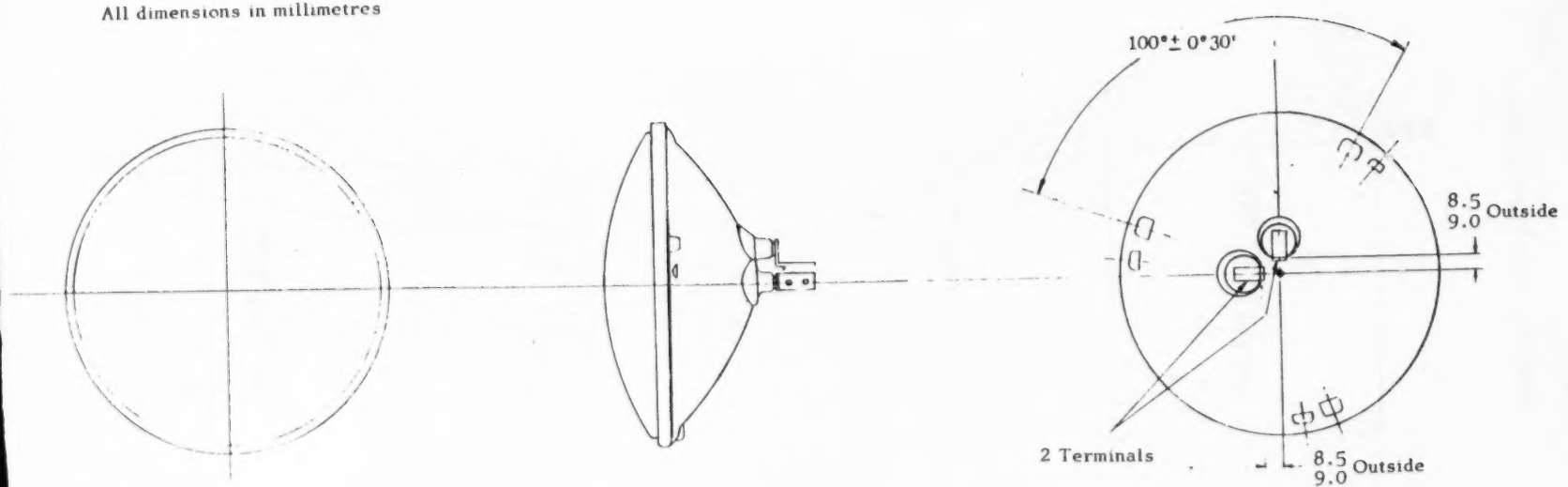
All dimensions in millimetres




Note: Same as Plate SB5 Sealed Beam Headlamp Unit, 145mm DIA, except as shown

PLATE SB7 - SEALED BEAM HEADLAMP UNIT, 145mm (5.75in) DIA. TYPE 2 SINGLE BEAM (PASSING ONLY)

All dimensions in millimetres




Note: Same as Plate SB5 Sealed Beam Headlamp Unit, 145mm DIA, except as shown

STANDARD EUROPEAN BEAM

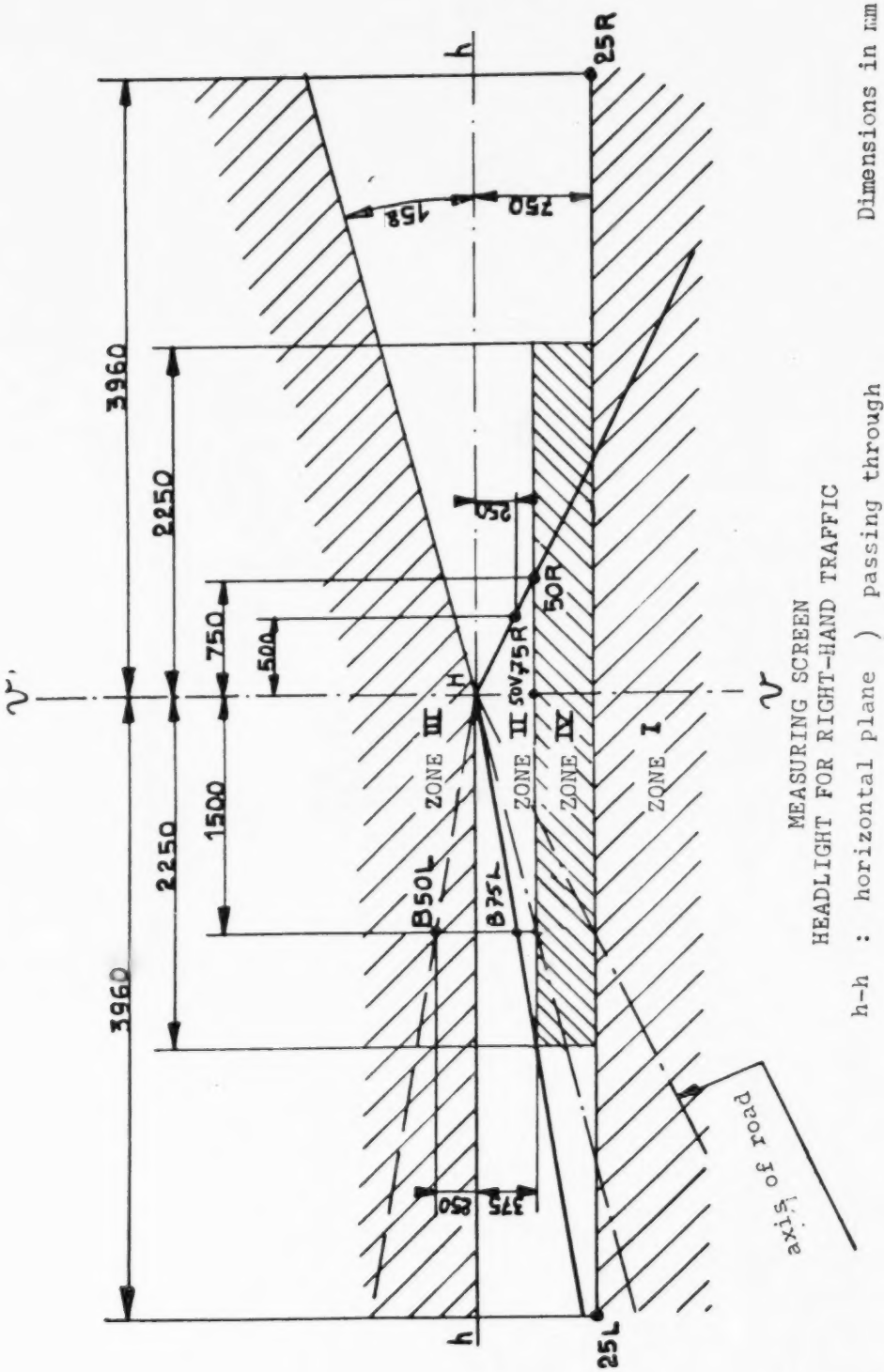
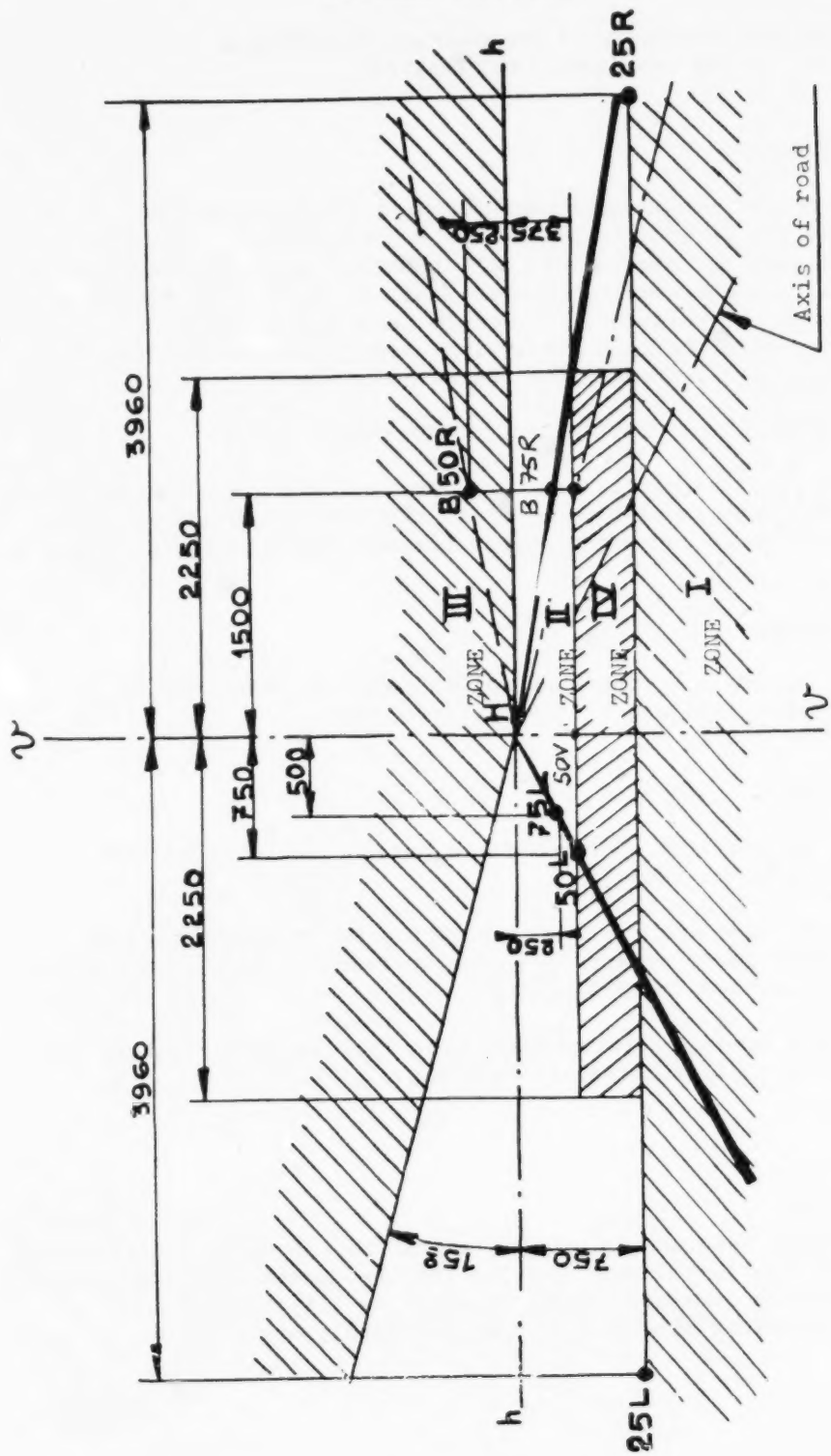



Plate $SB_{8a}$

STANDARD EUROPEAN BEAM




MEASURING SCREEN
HEADLIGHT FOR LEFT-HAND TRAFFIC

h-h : horizontal plane ) passing through focus
v-v : vertical plane ) centre of headlight

Dimensions in mm

Plate SB 25

Annex 5

TESTS FOR STABILITY OF PHOTOMETRIC PERFORMANCE
OF HEADLAMPS IN OPERATION

TESTS ON COMPLETE HEADLAMPS

Once the photometric values have been measured according to the prescriptions of this Regulation, in points for $E_{max}$ for driving beam and HV, 50 R, B 50 L for passing beam (or HV, 50L, B50R for headlamps designed for left-hand traffic) a complete headlamp sample shall be tested for stability of photometric performance in operation. "Complete headlamps" shall be understood to mean the complete lamp itself including those surrounding body parts and lamps which could influence its thermal dissipation.

1. TEST OF STABILITY OF PHOTOMETRIC PERFORMANCE

The tests shall be carried out in a dry and still atmosphere at an ambient temperature of 23° C ± 5° C, the complete headlamp being mounted on a base representing the correct installation on the vehicle.

1.1. Clear headlamp

The headlamp shall be operated for 12 hours as described in subparagraph 1.1.1. and checked as prescribed in subparagraph 1.1.2.

1.1.1. Test procedure

The headlamp shall be operated for a period according to the specified time, so that:

1.1.1.1. (a) in the case where only one lighting function (driving or passing beam) is to be approved, the corresponding filament is lit for the prescribed time, 2/

(b) in the case of a reciprocally incorporated passing lamp and driving lamp (dual filament SB headlamp):

---

2/ When the tested headlamp is grouped and/or reciprocally incorporated with signalling lamps, the latter shall be lit for the duration of the test. In the case of a direction indicator lamp, it shall be lit in flashing operation mode with an on/off time ratio of approximately one to one.

If the applicant declares that the headlamp is to be used with a single filament lit 1/ at a time, the test shall be carried out in accordance with this condition, activating 2/ each specified function successively for half the time specified in paragraph 1.1.;

In all other cases 1/ 2/ the headlamp, shall be subjected to the following cycle until the time specified is reached:

15 minutes, passing-beam filament lit
5 minutes, all filaments lit.

(c) in the case of grouped lighting functions all the individual functions shall be lit simultaneously for the time specified for individual lighting functions (a) also taking into account the use of reciprocally incorporated lighting functions (b), according to the manufacturer's specifications.

1.1.1.2. Test voltage

The voltage shall be adjusted so as to supply a wattage 15% (26% for 24 V types) higher than the rated wattage specified in this Regulation for the type(s) of SB headlamp(s) concerned is (are) obtained.

1.1.2. Test results

1.1.2.1. Visual inspection

Once the headlamp has been stabilized to the ambient temperature, the headlamp lens and the external lens, if any, shall be cleaned with a clean, damp cotton cloth. It shall then be inspected visually; no distortion, deformation, cracking or change in colour of either the headlamp lens or the external lens, if any, shall be noticeable.

1.1.2.2. Photometric test

To comply with the requirements of this Regulation, the photometric values shall be verified in the following points:

---

1/ Should two filaments be simultaneously lit when headlamp flashing is used, this shall not be considered as being normal use of both filaments simultaneously.

Passing beam:

50R - B50L - HV for headlamps designed for right-hand traffic
50L - B50R - HV for headlamps designed for left-hand traffic

Driving beam:

Point of $E_{max}$

Another aiming may be carried out to allow for any deformation of the headlamp base due to heat (the change of the position of the cut-off line is covered in para. 2 of this annex);

a 10% discrepancy between the photometric characteristics and the values measured prior to the test is permissible including the tolerances of the photometric procedure.

1.2. Dirty headlamp

After being tested as specified in subparagraph 1.1. above, the headlamp shall be operated for one hour as described in subparagraph 1.1.1., after being prepared as prescribed in subparagraph 1.2.1., and checked as prescribed in subparagraph 1.1.2.

1.2.1. Preparation of the headlamp

1.2.1.1. Test mixture

The mixture of water and a polluting agent to be applied to the headlamp shall be composed of nine parts (by weight) of silica sand with a grain size distributed between 0 and 100 µm, one part (by weight) of vegetal carbon dust of a grain size distributed between 0 and 100 µm, 0.2 part (by weight) of NaCMC 3/ and an appropriate quantity of distilled water, the conductivity of which is lower than 1 mS/m for the purpose of this test.

The mixture must not be more than 14 days old.

---

3/ NaCMC represents the sodium salt of carboxymethylcellulose, customarily referred to as CMC. The NaCMC used in the dirt mixture shall have a degree of substitution (DS) of 0.6-0.7 and a viscosity of 200-300 cP for a 2% solution at 20° C.

1.2.1.2. Application of the test mixture to the headlamp

The test mixture shall be uniformly applied to the entire light emitting surface of the headlamp and then left to dry. This procedure shall be repeated until the illumination value has dropped to 15-20% of the values measured for each following point under the conditions described in paragraph 1 above:

Point of $E_{max}$ in driving beam, photometric distribution for a driving/passing lamp,

Point of $E_{max}$ in driving beam, photometric distribution for a driving lamp only,

50R and 50V 4/ for a passing lamp only, designed for right-hand traffic,

50L and 50V 4/ for a passing lamp only, designed for left-hand traffic.

1.2.1.3. Measuring equipment

The measuring equipment shall be equivalent to that used during headlamp approval tests.

2. TEST FOR CHANGE IN VERTICAL POSITION OF THE CUT-OFF LINE UNDER THE INFLUENCE OF HEAT

This test consists of verifying that the vertical drift of the cut-off line under the influence of heat does not exceed a specified value for an operating passing lamp.

The headlamp tested in accordance with paragraph 1.1., shall be subjected to the test described in 2.1., without being removed from or readjusted in relation to its test fixture.

2.1. Test

The test shall be carried out in a dry and still atmosphere at an ambient temperature of 23° C ± 5° C.

Using a mass production SB headlamp which has been aged for at least one hour the headlamp shall be operated on passing beam without being dismounted from or readjusted in relation to its test fixture. (For the purpose of this test, the voltage shall be

---

4/ 50 V is situated 375 mm below HV on the vertical line v-v on the screen at 25 m distance.

adjusted as specified in para. 1.1.1.2.). The position of the cut-off line in its horizontal part (between vv and the vertical line passing through point B50L for right-hand traffic or B50R for left-hand traffic) shall be verified 3 minutes ($r_3$) and 60 minutes ($r_{60}$) respectively after operation.

The measurement of the variation in the cut-off line position as described above shall be carried out by any method giving acceptable accuracy and reproducible results.

2.2. Test results

2.2.1. The result expressed in milliradians (mrad) shall be considered as acceptable when the absolute value $\Delta r_I = | r_3 - r_{60} |$ recorded on the headlamp is not more than 1.0 mrad ($\Delta r_I \leq 1.0$ mrad).

2.2.2. However, if this value is more than 1.0 mrad but not more than 1.5 mrad (1.0 mrad $\Delta r_I \leq 1.5$ mrad) a second headlamp shall be tested as described in 2.1 after being subjected three consecutive times to the cycle as described below, in order to stabilize the position of mechanical parts of the headlamp on a base representative of the correct installation on the vehicle:

Operation of the passing lamp for one hour, (the voltage shall be adjusted as specified in paragraph 1.1.1.2.),

Period of rest for one hour.

The headlamp type shall be considered as acceptable if the mean value of the absolute values $\Delta r_I$ measured on the first sample and $\Delta r_{II}$ measured on the second sample is not more than 1.0 mrad

$$\left( \frac{\Delta r_I + \Delta r_{II}}{2} \leq 1.0 \text{ mrad} \right)$$

3. CONFORMITY OF PRODUCTION

One of the sampled headlamps shall be tested according to the procedure described in paragraph 2.1. after being subjected three consecutive times to the cycle described in paragraph 2.2.2.

The headlamp shall be considered as acceptable if $\Delta r$ does not exceed 1.5 mrad.

If this value exceeds 1.5 mrad but is not more than 2.0 mrad, a second headlamp shall be subjected to the test after which the mean of the absolute values recorded on both samples shall not exceed 1.5 mrad.

Annex 6

REQUIREMENTS FOR LAMPS INCORPORATING LENSES OF PLASTIC MATERIAL - TESTING OF LENS OR MATERIAL SAMPLES AND OF COMPLETE LAMPS

1. GENERAL SPECIFICATIONS

1.1. The samples supplied pursuant to paragraph 2.2.4. of Regulations Nos. 1, 8, 19, 20 or paragraph 3.2.4. of Regulations Nos. 5, 31, 57, 72 shall satisfy the specifications indicated in paragraphs 2.1 to 2.5 below.

1.2. The two samples of complete lamps supplied pursuant to paragraph 2.2.3. of Regulations Nos. 1, 8, 19, 20 or paragraph 3.2.3. of Regulations Nos. 5, 31, 57, 72 and incorporating lenses of plastic material shall, with regard to the lens material, satisfy the specifications indicated in paragraph 2.6. below.

1.3. The samples of lenses of plastic material or samples of material shall be subjected, with the reflector to which they are intended to be fitted (where applicable), to approval tests in the chronological order indicated in table A reproduced in appendix 1 to this annex.

1.4. However, if the lamp manufacturer can prove that the product has already passed the tests prescribed in paragraphs 2.1.-2.5. below, or the equivalent tests pursuant to another Regulation, those tests need not be repeated; only the tests prescribed in appendix 1, table B, shall be mandatory.

2. TESTS

2.1. Resistance to temperature changes

2.1.1. Tests

Three new samples (lenses) shall be subjected to five cycles of temperature and humidity (RH = relative humidity) change in accordance with the following programme:

3 hours at 40° C ± 2° C and 85-95% RH;

1 hour at 23° C ± 5° C and 60-75% RH;

15 hours at -30° C ± 2° C;

1 hour at 23° C ± 5° C and 60-75% RH;

3 hours at 80° C ± 2° C;

1 hour at 23° C ± 5° C and 60-75% RH;

Before this test, the samples shall be kept at 23° C ± 5° C and 60-75% RH for at least four hours.

Note: The periods of one hour at 23° C ± 5° C shall include the periods of transition from one temperature to another which are needed in order to avoid thermal shock effects.

2.1.2. Photometric measurements

2.1.2.1. Method

Photometric measurements shall be carried out on the samples before and after the test.

These measurements shall be made using a standard lamp, at the following points:

B 50 L and 50 R for the passing beam of a passing lamp or a passing/driving lamp (B 50 R and 50 L in the case of headlamps intended for left-hand traffic);

$E_{max}$ route for the driving beam of a driving lamp or a passing/driving lamp;

HV and $E_{max}$ zone D for a front fog lamp.

2.1.2.2. Results

The variation between the photometric values measured on each sample before and after the test shall not exceed 10% including the tolerances of the photometric procedure.

2.2. Resistance to atmospheric and chemical agents

2.2.1. Resistance to atmospheric agents

Three new samples (lenses or samples of material) shall be exposed to radiation from a source having a spectral energy distribution similar to that of a black body at a temperature between 5,500K and 6,000K. Appropriate filters shall be placed between the source and the samples so as to reduce as far as possible radiations with wave lengths smaller than 295 nm and greater than 2,500 nm. The samples shall be exposed to an energetic illumination of 1,200 $W/m^2$ ± 200 $W/m^2$ for a period such that the luminous energy that they receive is equal to 4,500 $MJ/m^2$ ± 200 $MJ/m^2$. Within the enclosure, the temperature measured on the black panel placed on a

level with the samples shall be 50° C ± 5° C. In order to ensure a regular exposure, the samples shall revolve around the source of radiation at a speed between 1 and 5 1/min.

The samples shall be sprayed with distilled water of conductivity lower than 1 mS/m at a temperature of 23° C ± 5° C, in accordance with the following cycle:

spraying: 5 minutes;
drying: 25 minutes.

2.2.2. Resistance to chemical agents

After the test described in paragraph 2.2.1. above and the measurement described in paragraph 2.2.3.1. below have been carried out, the outer face of the said three samples shall be treated as described in paragraph 2.2.2.2. with the mixture defined in paragraph 2.2.2.1. below.

2.2.2.1. Test mixture

The test mixture shall be composed of 61.5% n-heptane, 12.5% toluene, 7.5% ethyl tetrachloride, 12.5% trichloroethylene and 6% xylene (volume per cent).

2.2.2.2. Application of the test mixture

Soak a piece of cotton cloth (as per ISO 105) until saturation with the mixture defined in paragraph 2.2.2.1. above and, within 10 seconds, apply it for 10 minutes to the outer face of the sample at a pressure of 50 N/cm$^2$, corresponding to an effort of 100 N applied on a test surface of 14 x 14 mm.

During this 10-minute period, the cloth pad shall be soaked again with the mixture so that the composition of the liquid applied is continuously identical with that of the test mixture prescribed.

During the period of application, it is permissible to compensate the pressure applied to the sample in order to prevent it from causing cracks.

2.2.2.3. Cleaning

At the end of the application of the test mixture, the samples shall be dried in the open air and then washed with the solution described in paragraph 2.3. (Resistance to detergents) 23° C ± 5° C.

Afterwards the samples shall be carefully rinsed with distilled water containing not more than 0.2% impurities at 23° C ± 5° C and then wiped off with a soft cloth.

2.2.3. Results

2.2.3.1. After the test of resistance to atmospheric agents, the outer face of the samples shall be free from cracks, scratches, chipping and deformation, and the mean variation in transmission

$\Delta t = \frac{T2 - T3}{T_2}$, measured on the three samples according to the

procedure described in appendix 2 to this annex shall not exceed 0.020

($\Delta t_m \leq 0.020$).

2.2.3.2. After the test of resistance to chemical agents, the samples shall not bear any traces of chemical staining likely to cause a variation of flux diffusion, whose mean variation

$\Delta d = \frac{T5 - T4}{T_2}$, measured on the three samples according to the

procedure described in appendix 2 to this annex shall not exceed 0.020

($\Delta d_m \leq 0.020$).

2.3. Resistance to detergents and hydrocarbons

2.3.1. Resistance to detergents

The outer face of three samples (lenses or samples of material) shall be heated to 50° C ± 5° C and then immersed for five minutes in a mixture maintained at 23° C ± 5° C and composed of 99 parts distilled water containing not more than 0.02% impurities and one part alkylaryl sulphonate.

At the end of the test, the samples shall be dried at 50° C ± 5° C. The surface of the samples shall be cleaned with a moist cloth.

2.3.2. Resistance to hydrocarbons

The outer face of these three samples shall then be lightly rubbed for one minute with a cotton cloth soaked in a mixture composed of 70% n-heptane and 30% toluene (volume per cent), and shall then be dried in the open air.

2.3.3. Results

After the above two tests have been performed successively, the mean value of the variation in transmission

$\Delta t = \frac{T2 - T3}{T_2}$, measured on the three samples according to the procedure described in appendix 2 to this annex shall not exceed 0.010

($\Delta t_m \leq 0.010$).

2.4. Resistance to mechanical deterioration

2.4.1. Mechanical deterioration method

The outer face of the three new samples (lenses) shall be subjected to the uniform mechanical deterioration test by the method described in appendix 3 to this annex.

2.4.2. Results

After this test, the variations:

in transmission: $\Delta t = \frac{T2 - T3}{T_2}$,

and in diffusion: $\Delta t = \frac{T5 - T4}{T_2}$,

shall be measured according to the procedure described in appendix 2 in the area specified in paragraph 2.2.4. above. The mean value of the three samples shall be such that: $\Delta t_m \leq 0.100$; $\Delta d_m \leq 0.500$.

2.5. Test of adherence of coatings, if any

2.5.1. Preparation of the sample

A surface of 20 mm x 20 mm in area of the coating of a lens shall be cut with a razor blade or a needle into a grid of squares approximately 2 mm x 2 mm. The pressure on the blade or needle shall be sufficient to cut at least the coating.

2.5.2. Description of the test

Use an adhesive tape with a force adhesion of 2 N/(cm of width) ± 20% measured under the standardized conditions specified in

appendix 4 to this annex. This adhesive tape, which shall be at least 25 mm wide, shall be pressed for at least five minutes to the surface prepared as prescribed in paragraph 2.5.1.

Then the end of the adhesive tape shall be loaded in such a way that the force of adhesion to the surface considered is balanced by a force perpendicular to that surface. At this stage, the tape shall be torn off at a constant speed of 1.5 m/s ± 0.2 m/s.

2.5.3. Results

There shall be no appreciable impairment of the gridded area. Impairments at the intersections between squares or at the edges of the cuts shall be permitted, provided that the impaired area does not exceed 15 per cent of the gridded surface.

2.6. Tests of the complete lamp incorporating a lens of plastic material

2.6.1. Resistance to mechanical deterioration of the lens surface

2.6.1.1. Tests

The lens of lamp sample No. 1 shall be subjected to the test described in paragraph 2.4.1. above.

2.6.1.2. Results

After the test, the results of photometric measurements carried out on the lamp in accordance with this Regulation shall not exceed by more than 30% the maximum values prescribed at points B 50 L and HV and not be more than 10% below the minimum values prescribed at point 75 R (in the case of headlamps intended for left-hand traffic, the points to be considered are B 50 R, HV and 75 L), in the case of front fog lamps this requirement shall be applied to zones A and B only.

2.6.2. Test of adherence of coatings, if any

The lens of lamp sample No. 2 shall be subjected to the test described in paragraph 2.5. above.

3. VERIFICATION OF THE CONFORMITY OF PRODUCTION

3.1. With regard to the materials used for the manufacture of lenses, the lamps of a series shall be recognized as complying with this Regulation if:

3.1.1. After the test for resistance to chemical agents and the test for resistance to detergents and hydrocarbons, the outer face of the samples exhibits no cracks, chipping or deformation visible to the naked eye (see paras. 2.2.2., 2.3.1. and 2.3.2.);

3.1.2. After the test described in paragraph 2.6.1.1., the photometric values at the points of measurement considered in paragraph 2.6.1.2. are within the limits prescribed for conformity of production by this Regulation.

3.2. If the test results fail to satisfy the requirements, the tests shall be repeated on another sample of headlamps selected at random.

## Annex 6 - Appendix 1

### CHRONOLOGICAL ORDER OF APPROVAL TESTS

A. Tests on plastic materials (lenses or samples of material supplied pursuant to paragraph 2.2.4 (Regulations Nos. 1, 8, 19, 20; paragraph 3.2.4 in Regulations Nos. 5, 31, 57, 72) of this Regulation)

| Samples | | Lenses or samples of material | | | | | | Lenses | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tests | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 1.1. | Limited photometry (para. 2.1.2) | | | | | | | | | | X | X | X | |
| 1.1.1. | Temperature change (para. 2.1.1) | | | | | | | | | | X | X | X | |
| 1.2. | Limited photometry (para. 2.1.2) | | | | | | | | | | X | X | X | |
| 1.2.1. | Transmission measurement | X | X | X | X | X | X | X | X | X | | | | |
| 1.2.2. | Diffusion measurement | X | X | X | | | | X | X | X | | | | |
| 1.3. | Atmospheric agents (para. 2.2.1) | X | X | X | | | | | | | | | | |
| 1.3.1. | Transmission measurement | X | X | X | | | | | | | | | | |
| 1.4. | Chemicals agents (para. 2.2.2) | X | X | X | | | | | | | | | | |
| 1.4.1. | Diffusion measurement | X | X | X | | | | | | | | | | |
| 1.5. | Detergents (para. 2.3.1) | | | | X | X | X | | | | | | | |
| 1.6. | Hydrocarbons (para. 2.3.2) | | | | X | X | X | | | | | | | |
| 1.6.1. | Transmission measurement | | | | X | X | X | | | | | | | |
| 1.7. | Deterioration (para. 2.4.1.) | | | | | | | X | X | X | | | | |
| 1.7.1. | Transmission measurement | | | | | | | X | X | X | | | | |
| 1.7.2. | Diffusion measurement | | | | | | | X | X | X | | | | |
| 1.8. | Adherence (para. 2.5) | | | | | | | | | | | | | X |

B. Tests on complete lamps (supplied pursuant to paragraph 2.2.3 (Regulations Nos. 1, 8, 19, 20; paragraph 3.2.3 in Regulations Nos. 5, 31, 57, 72) of this Regulation)

| Tests | Complete lamp | |
|---|---|---|
| | Sample No. | |
| | 1 | 2 |
| 2.1. Deterioration (para. 2.6.1.1) | X | |
| 2.2. Photometry (para. 2.6.1.2) | X | |
| 2.3. Adherence (para. 2.6.2) | | X |

## Annex 6 - Appendix 2

### METHOD OF MEASUREMENT OF THE DIFFUSION AND TRANSMISSION OF LIGHT

1. EQUIPMENT (see figure)

The beam of a collimator K with a half divergence $\frac{\beta}{2} = 17.4 \times 10^{-4}$ rd is limited by a diaphragm $D_T$ with an opening of 6 mm against which the sample stand is placed.

A convergent achromatic lens $L_2$, corrected for spherical aberrations, links the diaphragm $D_T$ with the receiver R; the diameter of the lens $L_2$ shall be such that it does not diaphragm the light diffused by the sample in a cone with a half top angle of $\beta/2 = 14°$.

An annular diaphragm $D_D$ with angles $\frac{\alpha_o}{2} = 1°$ and $\frac{\alpha_{max}}{2} = 12°$ is placed in an image focal plane of the lens $L_2$.

The non-transparent central part of the diaphragm is necessary in order to eliminate the light arriving directly from the light source. It shall be possible to remove the central part of the diaphragm from the light beam in such a manner that it returns exactly to its original position.

The distance $L_2$ $D_T$ and the focal length $F_2$ 1/ of the lens $L_2$ shall be so chosen that the image of $D_T$ completely covers the receiver R.

When the initial incident flux is referred to 1,000 units, the absolute precision of each reading shall be better than 1 unit.

2. MEASUREMENTS

The following readings shall be taken:

| Reading | With sample | With central part of $D_D$ | Quantity represented |
|---|---|---|---|
| $T_1$ | no | no | Incident flux in initial reading |
| $T_2$ | yes (before test) | no | Flux transmitted by the new material in a field of 24° C |
| $T_3$ | yes (after test) | no | Flux transmitted by the tested material in a field of 24° C |
| $T_4$ | yes (before test) | yes | Flux diffused by the new material |
| $T_5$ | yes (after test) | yes | Flux diffused by the tested material |

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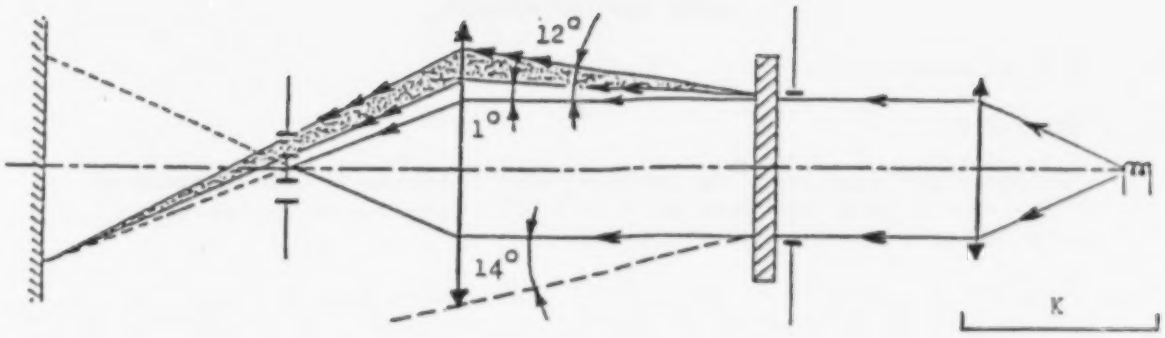
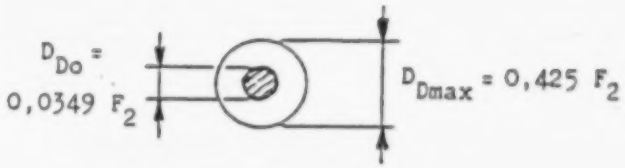
1/ For $L_2$ it is recommended to use a focal distance of about 80 mm.


12°
1°
14°
K


$D_{Do}$ =
0,0349 $F_2$
$D_{Dmax}$ = 0,425 $F_2$

R
$F_2$
$L_2$
$L_1$
$D_D$
$D_T$

## Annex 6 - Appendix 3

## SPRAY TESTING METHOD

1. Test equipment

1.1. Spray gun

The spray gun used shall be equipped with a nozzle 1.3 mm in diameter allowing a liquid flow rate of 0.24 ± 0.02 l/minute at an operating pressure of 6.0 bars - 0, + 0.5 bar.

Under these operation conditions the fan pattern obtained shall be 170 mm ± 50 mm in diameter on the surface exposed to deterioration, at a distance of 380 mm ± 10 mm from the nozzle.

1.2. Test mixture

The test mixture shall be composed of:

Silica sand of hardness 7 on the Mohr scale, with a grain size between 0 and 0.2 mm and an almost normal distribution, with an angular factor of 1.8 to 2;

Water of hardness not exceeding 205 g/m³ for a mixture comprising 25 g of sand per litre of water.

2. Test

The outer surface of the lamp lenses shall be subjected once or more than once to the action of the sand jet produced as described above. The jet shall be sprayed almost perpendicular to the surface to be tested.

The deterioration shall be checked by means of one or more samples of glass placed as a reference near the lenses to be tested. The mixture shall be sprayed until the variation in the diffusion of light on the sample or samples measured by the method described in appendix 2, is such that:

$$\Delta d = \frac{T5 - T4}{T_2} = 0.0250 \pm 0.0025$$

Several reference samples may be used to check that the whole surface to be tested has deteriorated homogeneously.

## Annex 6 - Appendix 4

### ADHESIVE TAPE ADHERENCE TEST

1. PURPOSE

This method allows to determine under standard conditions the linear force of adhesion of an adhesive tape to a glass plate.

2. PRINCIPLE

Measurement of the force necessary to unstick an adhesive tape from a glass plate at an angle of 90°.

3. SPECIFIED ATMOSPHERIC CONDITIONS

The ambient conditions shall be at 23° C ± 5° C and 65 ± 15 per cent relative humidity (RH).

4. TEST PIECES

Before the test, the sample roll of adhesive tape shall be conditioned for 24 hours in the specified atmosphere (see para. 3 above).

Five test pieces each 400 mm long shall be tested from each roll. These test pieces shall be taken from the roll after the first three turns were discarded.

5. PROCEDURE

The test shall be under the ambient conditions specified in paragraph 3.

Take the five test pieces while unrolling the tape radially at a speed of approximately 300 mm/s, then apply them within 15 seconds in the following manner:

Apply the tape to the glass plate progressively with a slight lengthwise rubbing movement of the finger, without excessive pressure, in such a manner as to leave no air bubble between the tape and the glass plate.

Leave the assembly in the specified atmospheric conditions for 10 minutes.

Unstick about 25 mm of the test piece from the plate in a plane perpendicular to the axis of the test piece.

Fix the plate and fold back the free end of the tape at 90°. Apply force in such a manner that the separation line between the tape and the plate is perpendicular to this force and perpendicular to the plate.

Pull to unstick at a speed of 300 mm/s ± 30 mm/s and record the force required.

6. RESULTS

The five values obtained shall be arranged in order and the median value taken as the result of the measurement. This value shall be expressed in Newtons per centimetre of width of the tape."

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